Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations November-2020

LINEAR CONTROL SYSTEMS

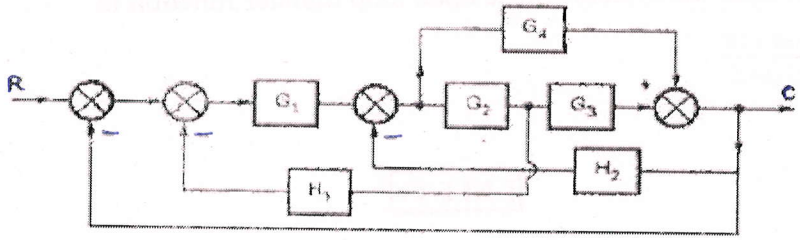
(Common to EEE & ECE)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 Using block diagram reduction technique, find the transfer function of the system. **12M**



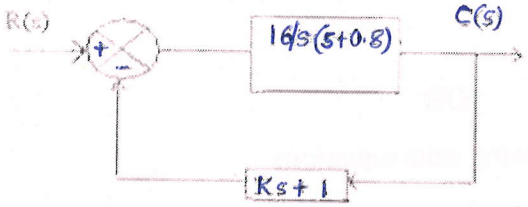
OR

2 a Deduce the transfer function of armature controlled DC servo motor with neat diagram. **8M**

b Distinguish between block diagram reduction technique and signal flow graph. **4M**

UNIT-II

3 A positional control system with velocity feedback shown in figure. What is the response c(t) to the unit step input. Given that damping ratio= 0.5. Also calculate rise time, peak time, maximum overshoot and settling time. **12M**



OR

4 What is meant steady state error? Derive the static error components for Type 0, Type 1 & Type 2 systems? **12M**

UNIT-III

5 With the help of Routh"s stability criterion find the stability of the following systems represented by the characteristic equations:

a $s^4 + 8s^3 + 18s^2 + 16s + 5 = 0$. 3M

b $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$. 6M

c $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$. 3M

OR

6 Sketch the root locus of the system whose open loop transfer function is 12M

$G(S)H(S) = \frac{K(S^2+6S+25)}{S(S+1)(S+2)}$

UNIT-IV

7 a Define and derive the expression for resonant frequency. 6M

b Draw the magnitude bode plot for the system having the following transfer function: 6M

$G(S)H(S) = \frac{2000(S+1)}{S(S+10)(S+40)}$

OR

8 Obtain the transfer function of Lead Compensator, draw pole-zero plot and write the procedure for design of Lead Compensator using Bode plot. 12M

UNIT-V

9 a State the properties of state transition matrix 6M

b Diagonalize the following system matrix 6M

$$A = \begin{bmatrix} 0 & 6 & -5 \\ 1 & 0 & 2 \\ 3 & 2 & 4 \end{bmatrix}$$

OR

10 A system is characterized by the following state equations

$\dot{X}_1 = -3X_1 + X_2$; $\dot{X}_2 = -2X_1 + U$; $Y = X_1$

a Find the transfer function and stability of the system. 6M

b Compute the state transition matrix 6M

*** END ***